

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

EndTerm Examination (Regular/Backlog), November 2016
Bachelor of Technology, Semester I

Roll No.....

ME 201: Engineering Mechanics

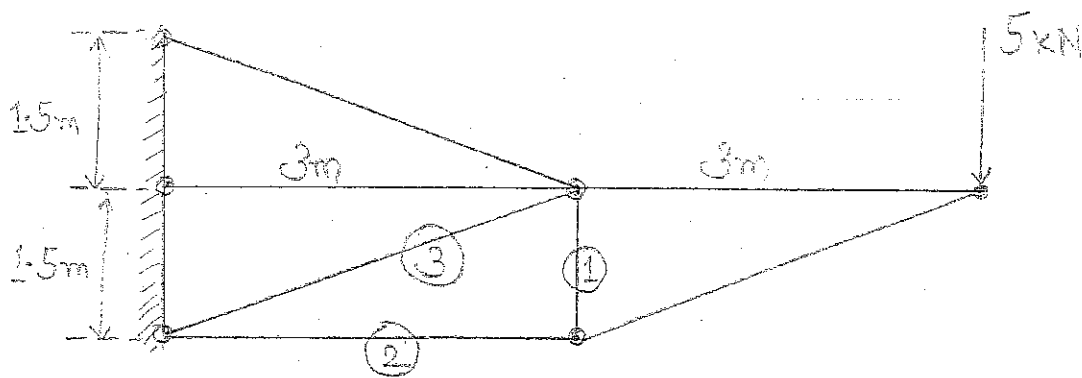
Time: 3 hours

Max. Marks: 100

Instructions to students:

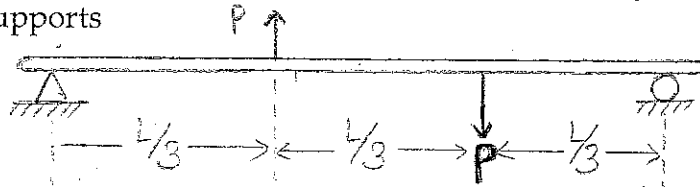
1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

- Q.1A Explain in brief (10 questions @ 1 mark) 10
- i. Section Modulus
 - ii. Polar Moment of Inertia
 - iii. System of forces
 - iv. Lami's Theorem
 - v. Principle of Work and Energy
 - vi. Coefficient of restitution
 - vii. Relative Distance
 - viii. D'Alembert's Principle
 - ix. The path travelled by a projectile is of degree.
 - x. Minimum no. of members required to form a simple truss are
- Q.2 Short answer type questions (4 questions @ 2.5 marks) 10
- i. Define rigid body.
 - ii. State triangle law of forces. What is the use of this law?
 - iii. Write a short note on Varignon's theorem
 - iv. Difference between moment of a force and torque.
- Q.3A Differentiate between mass moment of inertia and area moment of inertia. 05
- Q.3B Find the expression for angular impulse. 05
- Q.4A A string 2m long is tied to the ends of a uniform rod that weighs 60N and is 1.6m long. The string passes over a nail so that the rod hangs vertically. The tension in the string will be 05
- Q.4B A body of mass 10 kg moving with velocity of 1m/s is acted upon by a force of 50N for two seconds. The final velocity will be... 05
- Q.5A Write assumptions made while solving a problem of truss/es. 05
- Q.5B Using the method of sections, find the axial force in each of bars 1, 2, 3 of the plane truss. 05



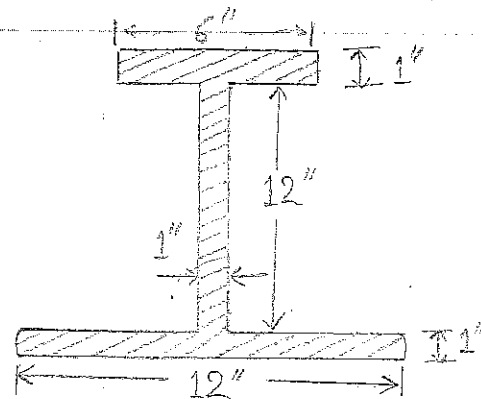
- Q.6A Two forces P act on the beam AB , as shown in fig J. Determine graphically the reactions R_a and R_b at the supports

05



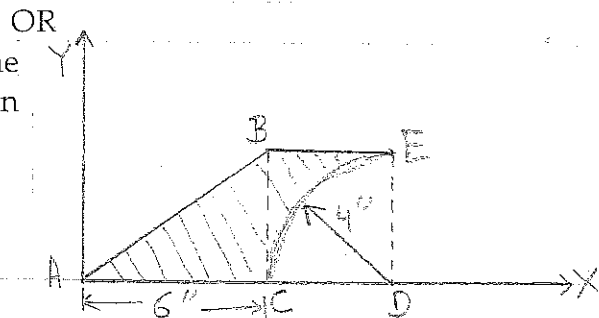
- Q.6B Determine the moment of inertia of the area shown in fig with respect to its centroidal axis.

05



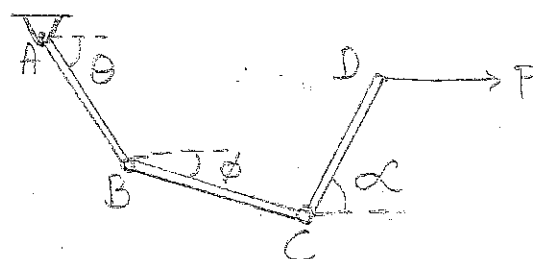
- Q.6B Find the moment of area about the indicated y axis for the shaded area in fig.

05



- Q.7A In fig the link BD is pinned at C to a collar which is free to slide along the fixed vertical shaft. Find the force P supplied by a hydraulic cylinder on the collar to maintain W for any value of θ . (Use virtual work method)

05



- Q.7B An auto is moving at 20 fps and accelerating 5 fps² to overtake an auto B which is 384 ft ahead. If auto B is moving at 60 fps and decelerated at 3 fps², how soon will A pass B.

05

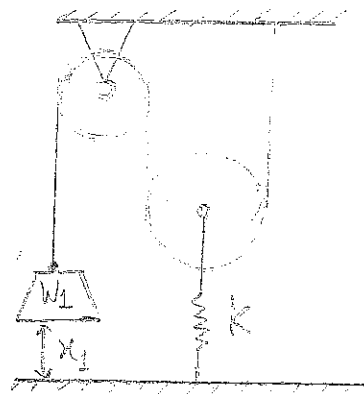
OR

- Q.7B Oil with a specific gravity of 0.9 is flowing at 10 fps in a straight pipe 2 ft in diameter and 2000 ft long. How long will it take to close a valve at a discharge end without raising the avg pressure more than 40 psi.

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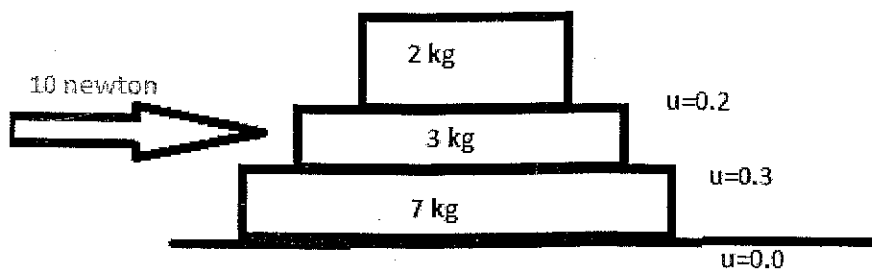
- Q.8 If the system in fig is released from the rest in the configuration defined by $X_1=0$, what maximum height above the floor will the block W_1 attain after release.

10



Q.9A

10



A 10 N force is applied on the 3 kg block. What are the accelerations of the 2 kg block, 3 kg block and 7 kg block? Take the value of $g=10\text{m/s}^2$.

- Q.9B Determine the centroid of the quarter circle whose radius is r .

10

OR

- Q.9B Determine the centre of gravity of a slender homogeneous wire bent into the shape of a semi circle.

10